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ABSTRACT

This digest reviews briefly several futures-oriented efforts of pertinence to educational endeavors, focusing primarily on their environmental aspects. These efforts are considered under headings in the form of six questions. They are: (1) Are future studies scientific? (2) How are projections developed? (3) What do recent futuristic projections suggest? (4) How valid are such projections? (5) How can alternative futures be approached? and (6) Are resource/environment considerations really necessary? Selected references are included and suggestions for identifying additional resources are offered. (ML)

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Environmental Education Digest No. 2 1984

STUDYING THE FUTURE THROUGH ENVIRONMENTAL EDUCATION

Environmental education is to a large extent predicated on concern for the future; to the extent that humans fail to behave in an environmentally responsible fashion, the future may be projected to be correspondingly bleak. This is held to be true in terms of use, overuse, and abuse of natural resources, both potentially sustainable and unequivocally non-renewable, as well as with respect to more immediate, perhaps more dramatic, environmental pollution considerations.

In recent years, the strident environmental "gloom and doom" outcries of the late 1960s and most of the 1970s have been attenuated by shifts in public concern to other issues such as economics, while the energies of the educational community have become heavily focused on "the basics," traditionally defined. Nonetheless, opinion polls continue to demonstrate that environmental quality remains a high public priority, and there is among both scientists and educators substantial interest in interrelationships between science and society.

There is also great interest in "the future" as an area of study; it is often associated with global concerns. To the extent that global and/or future studies accord attention to environmental considerations, they become appropriate vehicles for environmental education. From another perspective, future/global studies which do **not** include the environment as a major area of emphasis are at best incomplete, and are quite likely to be misleading and/or simplistic.

This **digest** reviews briefly several major futures-oriented efforts of pertinence to educational endeavors, focusing primarily on their environmental aspects.

Are Future Studies "Scientific?"

The literature and traditions of many cultures are replete with expressions of concern for the future; the Old Testament prophets of the Judeo-Christian religions are familiar examples. As an area of scientific study, "futurology" found an early spokesperson in the Rev. Robert Thomas Malthus, who nearly two centuries ago published the results of studies of the evolving relationships between agricultural production and human population growth. Employing rigorous analysis of sound data, Malthus concluded that incremental, eventually catastrophic, deficits in availability of food supplies were in humankind's future. His conclusions were based on linear projections of historically established, and verifiable, trends of increases in food production and human population; the former was clearly rising arithmetically, the latter geometrically.

Projections such as these are based on the assumption that the trends will continue; prediction enters the picture at the point where possible and/or probable outcomes are hypothesized, particularly with respect to interactions among projections. Malthus's procedures provide a prime example, perhaps the prime example, of classical methods of looking at the future. Until the quite recent past, linear projections have been the commonly employed procedure of looking at the future in situations where scientific data were available and used.

The term "Malthusian" is often applied to dire predictions; the use of the terms frequently carries the additional negative connotation of its lack of scientific value—i.e., the human race has not yet starved to death, Malthus was "wrong," so it follows that Malthusian predictions, being in the same class, must also be erroneous. Following such logic, it is possible to arrive at the position at which all predictions of negative outcomes are discounted and/or discarded. This position may be accompanied by the not-necessarily-subtle implication that predicted outcomes may have been those desired, so that evidence cited and used in making projections was selected on the basis of its capability of doing so. This is no doubt true of some predictions, but it is unfortunate that Malthus's name has been and is associated with them; his work continues to deserve serious attention, at least because of its scientific rigor.

Malthus's predictions have not come true on a global scale, and are at present discounted by many. At the very least, his time line has not proved true. The most significant cause of this failure was the unpredictable, spectacularly rapid advancement of technology, as exemplified by the Industrial Revolution and, more recently, the Green Revolution. Some will argue that it is as reasonable to project rapid technological advancement as it is to project other changes in a linear fashion. Had Malthus done so, his predictions would no doubt have been appreciably less drastic, certainly not so dire. But on what basis might he have projected technological advancement?

How are Projections Developed?

To project trends, data are needed; the greater the quantity and quality of available, properly selected and organized data, the greater the level of confidence that may be attached to the projections derived from them. The scientific enterprise thrives on data, and has increasingly done so for half a millenium. For studies dealing with the future, it is first necessary to identify and gather the data needed for establishing trends of interest; then, these data must be "processed" in such a manner that meaningful information is derived.

The introduction of high-capacity, high-speed computer technology has provided a mechanism for dealing with such data-processing concerns. One of the first to apply these technologies to future studies was Forrester (1971), who dealt with trends in human population growth, agricultural production, capital investment, environmental pollution, natural resource depletion, and "quality of life." His data were aggregated on a global scale; his procedure did not include a specific projection dealing with technological advancement; his conclusions were Malthusian in the "gloom and doom" sense. The better-known Club of Rome *Limits to Growth* report (Meadows, *et al.*, 1972) was an expansion of the Forrester study— more data, more precisely defined relationships, but not much difference in conclusions.

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During the past decade, a number of additional studies using computer models to project future conditions have appeared. In general, they have attempted to sharpen their projections by subsuming more data and disaggregating it so as to approach analyses on regional, as opposed to global, levels. The intent of disaggregation is not to deemphasize global implications of projections made, but to fine-tune the understanding and predictive power of relationships detected and projected—that is, to make them more realistic in terms of their implications for the future.

What Do Recent Futuristic Projections Suggest?

That the future has been a topic of continuing public interest is evidenced by *The Global 2000 Report to the President: Entering the Twenty-First Century* (Barney, *et al.*, 1980a, 1980b, 1980c), developed by U.S. federal government agencies under the leadership of the President's Council on Environmental Quality and the U.S. Department of State. The report consists of projections of what might be expected to happen in terms of human populations, resources, and the environment if policies in force during the late 1970s were to continue. Its stated purpose was to serve as the foundation for long-term governmental planning. The report's projections indicated the potential for "global problems of alarming proportions by the year 2000," much as have many future-oriented studies of the recent past. In this particular case, projections were made to the year 2000, but not beyond.

How Valid Are Such Projections?

Because the outcomes anticipated in such studies are based on the assumption of the continuation of existing trends, it follows that changes in trends, whether planned or otherwise, will cause changes in projected outcomes. Thus, it appears that a valid use of projections and associated predicted outcomes lies, after a set of interacting projections is made, in evaluating the desirability of the apparent outcomes, then evaluating various possible changes in trends, projections, and potential outcomes which might be forthcoming. For example, the *Global 2000* study developed projections based on continuation of existing policies, as noted above. But what if those policies were changed? It takes little imagination to realize that the projections would also change. The questions of concern are, how? and so what?

How Can "Alternative Futures" Be Approached?

In the past two decades, the concept of "alternative futures" has been widely explored (Shane, 1973). The basic problem with linear projections is that they assume, a priori, a continuation of present trends. The associated danger is that this assumption may prepare the mind for their apparent inevitability; simply, one assumes that existing patterns will continue, so planning for the future is based on that assumption. Thus, self-fulfilling prophecies may result.

An alternative futures model will identify the directions in which current trends are leading, but it then asks the question, "What change(s) in our existing planning will change these trends, and in what way(s)?" Thus, multiple options for creating modifications in projections may be considered, and the probable results of these modifications may be projected. Use of the computer as a data processor can speed up the development of alternative futures models by allowing for the rapid manipulation of massive amounts of data.

For example, the Meadows *Limits to Growth* model is designed so that its variables can be computer-manipulated, singly or in various desired combinations, to produce "new" projections for analysis. It is possible to select a modification or set of modifications which will produce a desired projection, then initiate planning which will lead to these modifications, thus producing (on paper) a desired alternative future. This is relatively easy to do in a modeling sense, but the question of the completeness and accuracy of the model itself makes it somewhat more complex with respect to the levels of confidence which may be associated with the veracity of the projections. Implicit are the bottom-line questions—How good are the data on which these projections are based? Do we have sufficient justification to propose these changes in our approach to planning? How certain are we that we know enough to place confidence in our "new" analyses?

Are Resource/Environment Considerations Really Necessary?

It should be noted that all of the studies referenced above place major emphasis on resource/environment considerations; all assume that such concerns are at the heart of future studies. It is possible, by assuming that technological advancements can and will overcome problems associated with resources and the environment, to define their importance out of the problem; some future studies have done so. Whether or not it is reasonable to make such an assumption is a deep-seated question which, unfortunately, still comes down to individual perspective—the optimist says yes, the pessimist says no. Each can support his/her position, but neither has to date unequivocally refuted the opposite one.

All of this presents the teacher with a difficult set of challenges. Should he or she take an optimistic or pessimistic, position in dealing with "the future" as an instructional area? Is it possible, or appropriate, to take a neutral position? How large a role should resource/environmental concerns play in future studies? How do future studies "fit" into existing curricula, or emerging ones? Is their omission justifiable?

Many resources in addition to those noted above are available, through the ERIC system and from other sources. For example, an ERIC search through November 1984 coupling the descriptors "environmental education" and "futures of society" indicates 239 citations, 147 of which are listed in *Resources in Education*, with the remainder journal papers referenced in *Current Index to Journals in Education*. Judicious use of other combinations of descriptors will locate additional documents.

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